

CICHLID FISHES IN THE WEST INDIES WITH ESPECIAL REFERENCE TO HAITI, INCLUDING THE DESCRIP- TION OF A NEW SPECIES OF *CICHLASOMA*.¹

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(Figs. 269-272 incl.)

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INTRODUCTION

The present paper is a continuation of studies made on the fishes of Haiti which were started in 1927 under the direction of Dr. William Beebe, as a result of the Haitian Expedition of the Department of Tropical Research of the New York Zoological Society. The marine fish of the island were reported upon by Beebe and Tee-Van in 1928, the mainly freshwater families Cichlidae and Poeciliidae being omitted in their ac-

¹ Contribution No. 475, Department of Tropical Research, New York Zoological Society.

count. The specimens of the former family are here reported upon, and the fishes of the latter will be treated by Dr. George S. Myers of the United States National Museum.

Cichlid fishes have been the source of considerable controversy, both as to their distribution, recent and fossil, and as to the validity of many species. The present paper, it is hoped, will add to the understanding of the Antillean forms.

CICHLID FISHES IN THE WEST INDIAN ISLANDS EXCLUSIVE OF HAITI

Fishes of the family Cichlidae have at one time or another been reported from the following West Indian Islands: Trinidad, Barbados, Jamaica and Cuba, in addition to the records that are the subject of this paper.

TRINIDAD: As far as the West Indian Islands are concerned, the Trinidad records may be immediately dismissed. The zoological affinities of Trinidad with South America are so close that there is no reason for considering the island as part of the West Indian archipelago, and this is further borne out by the fact that the Trinidad cichlids are also known from the neighboring mainland.

BARBADOS: The record of *Cichlasoma adpersum* (Günther, 1862) from Barbados is exceedingly questionable. Hubbs (1920, p. 4) has shown that the single specimen upon which the species was based falls easily within the range of variation of the Cuban species, *Cichlasoma tetracanthus*. In confirmation of this it may be stated that Pellegrin (1904), who had specimens of *Cichlasoma* from Cuba, gave them the name *adpersum*, thus suggesting the similarity if not identity of the fish of the Cuban and Barbadian records. Later, Myers (1928, pp. 34-35) stated that he chose to believe for the present that the Barbadian record was an error. As the species has been unrecorded from Barbados or any of the surrounding islands since the original description, and as the single specimen can be shown to be identical with the Cuban species, I see no reason for not concluding that the Barbadian record was an error, and that *adpersum* should be relegated to the synonymy of *tetracanthus*. Hubbs (1920) has already come to this conclusion.

JAMAICA: Pellegrin (1904, p. 187) recorded *Cichlasoma octofasciatum* (Regan), a Central American cichlid, from Jamaica. This record is most likely an error, although it is quite possible that cichlids may be found on the island, as the geographical location of the island is within the range of the genus. However, the probability of a Jamaican species of *Cichlasoma* being identical with one from Central America, considering the high degree of speciation to be found in the latter region, is very small. Under any circumstances, Pellegrin's record need not trouble us as far as the Cuban and Haitian forms discussed in this paper are concerned, as the specimen he recorded belonged to the group in *Cichlasoma* possessing eight to ten anal spines, while the others mentioned have but four.

CUBA: Cichlids have long been known from the island of Cuba, *tetracanthus* having been described by Cuvier and Valenciennes in 1831. During recent years the systematic treatment of the Cuban cichlids has been rather a tempestuous one. It may briefly be reviewed as follows:

Eigenmann in 1904 studied a series of 236 specimens from the island, and came to the conclusion that "An examination of all of these proves either the presence of several instead of a single species or a remarkable variation with localities." He hesitatingly divided his specimens into five subspecies of *tetracanthus*, and one new species, *nigricans*, stating, however, that, "I venture to describe here certain of the aberrant forms as new, without, however, feeling that they are distinct varieties or species, or that some of the other forms referred to *H. tetracanthus* are not also new."

Pellegrin in his revision of the Cichlidae (1904) determined all of his Cuban specimens as *adpersum*, listing no specimens under the name of *fuscomaculatus*, the synonym that he chose to use in place of *tetracanthus*.

Regan in his 1905 revision of the genus *Cichlasoma*, synonymized, without comment, under *C. tetracanthus*, all of the forms erected by Eigenmann. His action was based on twenty-six of Eigenmann's specimens.

Eigenmann in his "Catalogue of the Fresh-Water Fishes of Tropical and South Temperate America," (1909), disagreed with this decision, as he restored all of his original subspecies and species to full specific rank.

Hubbs in 1920 examined part of the material upon which Eigenmann had worked, and some additional specimens. After reiterating Eigenmann's account of the extreme variability of the Cuban forms and otherwise discussing the situation, he states: "In other words, the variations have at most an imperfect geographical significance. The variations in form possibly are sexual, for some large individuals are slender, while others are robust; the variations in color are perhaps correlated with sex, and imperfectly with age. Most of the variations, however, seem to be of an individual, rather than racial, sexual, or age, character."

Hubbs also reviewed the status of each of the species and subspecies named by Eigenmann and concluded that, "Unless further evidence of their distinctness is forthcoming, therefore, more than one form of cichlid can scarcely be recognized in Cuba."

To summarize the West Indian situation, it is apparent that, omitting Haiti, cichlid fishes are definitely known in the West Indian islands only from Cuba, that the Cuban fish is an exceedingly variable one, and that while the present Jamaican record is questioned, it is quite possible that fishes of this group will be found on that island.

In connection with the variability of the Cuban fish, it is of interest to record the present distribution of the species of *Cichlasoma* on the mainland of Central and South America. The distributions given in Eigenmann's Catalogue (1904) plus the ranges given for new species since the publication of that volume result in the following tables:

RANGE	Number of Species Recorded
<i>South America</i>	
Paraguay to Trinidad.....	1
Paraguay to Orinoco.....	1
La Plata Basin.....	1
La Plata Basin and S. E. Brazil.....	4
E. Central Brazil.....	1
Amazons	4
Amazons, Guiana	4
Rio Negro and Orinoco.....	1

RANGE		Number of Species
<i>South America</i> (continued)		Recorded
Ecuador		2
Colombia		4
Total Number of South American	Species	18
<i>Central America</i>		
Panama and Colombia.....		1
Panama		5
Panama and Guatemala.....		1
Costa Rica		8
Nicaragua		14
Salvador		1
Honduras		1
British Honduras		1
Honduras and Guatemala.....		1
Guatemala		13
Guatemala to Mexico.....		3
Mexico to Nicaragua.....		1
Mexico		21
Total Number of Central American	Species	71

These tables are suggestive when the variability of the Cuban form is taken into consideration. They show that in the continental mass of South America, species are relatively few in number and on the whole possess wide distributions. In Central America the condition is quite different. Here the variability of the fishes of the genus has expressed itself in the production of some 71 known forms, four times as many as in the much larger but more uniform land mass of South America. The recorded ranges of the Central American fish are also much smaller, many being restricted to one river or lake system. Although the geographical conditions in the two regions are quite different, it is felt that the large number of species from Central America may be the result of lack of comparative material, both geographical and as far as size and sex are concerned, and, judging by the Cuban fish, that many of the pres-

ent recognized species may represent but phases or local races of other species.

CICHLID FISH IN THE ISLAND OF HAITI (HISPANIOLA)

The presence of fishes of this family in the island of Haiti was unknown until 1924, when Cockerell described a fossil species, *Cichlasoma woodringi*, from upper or middle Miocene strata.

In 1928 Myers noted the first living fish, as the result of a specimen taken in the Gurabo River in the northern part of the Dominican Republic. He stated that his single specimen "is close to or identical with *C. tetracanthus* of Cuba, differing only slightly from Regan's description of that fish. The pelvic fins reach the anal fin, the caudal peduncle is nearly as long as deep, and the dorsal spines increase in length to the ninth, thence slightly decrease to the last." This description differs from the material from the Haitian Expedition, and will be noted later.

During the Haitian Expedition of the Department of Tropical Research many cichlids were observed and sixty-nine specimens ranging from 23 mm. to 215 mm. were preserved.

An examination of this material reveals a considerable amount of variation, both in form and in color, the latter ranging from pale gray to brownish black, with and without black bands, bars and spots. These variations are somewhat difficult to correlate with other factors. However, field notes seem to bear out that there is a sexual difference in some of the color variations, as a pale and a dark colored specimen were often taken at the same time. Unfortunately, our smaller sized material is not sufficiently well preserved to determine this question. The variations in form, while not as extensive as those shown by the Cuban fishes, are still quite considerable.

IDENTIFICATION OF THE CONTEMPORARY HAITIAN SPECIES AND COMPARISON WITH THE CUBAN FORM

The Haitian fishes examined are from four localities and three drainage basins, as follows:

- 1—Gurabo River near Las Quemados, Santo Domingo. This is in the drainage basin of the Rio Yaqui del Norte.
- 2—Hinche, on the Guayamouc River, Haiti. This is part of the Artibonite River system.
- 3—Étang Saumâtre, a saline lake in the Cul-de-Sac Plain of Haiti.
- 4—Grande Rivière de Cul-de-Sac, in the plain of the same name in Haiti.

The two last mentioned localities are in the same general basin, and although the lake has no outlet and is separated from the river by a distance of approximately 10 kilometres, the fishes of the two localities appear to be the same.

Examination of the material reveals that the Haitian fish is close to the Cuban species, as might be expected, and that the situation is similar to the one in that island as far as apparent variability is concerned. It is also evident from this relatively scanty material that specimens from the other drainage basins of Haiti are needed for comparison, as variation correlated with locality is indicated by the materials.

These conclusions are based on the following facts:

1. The Gurabo River specimen, from a basin separated from those of the other fishes, is evidently a separate form. In appearance and measurements it is different from our Cul-de-Sac Plain specimens, but its relationship is difficult to establish on the basis of a single fish. This specimen is the one that Dr. Myers reported upon in 1928, and he will report further on it in other publications. Whether the differences demonstrated by this fish from the other Haitian fishes are to be ascribed to variation or whether each of the drainage basins possesses a separate form will depend upon the procuring of additional specimens.

2. The Hinche specimens from the Artibonite basin cannot be directly compared either with the Gurabo River or the Cul-de-Sac Plain fish, because of the disparity in size. The three fish are 141 mm., 161 mm. and 215 mm. long, while the largest Cul-de-Sac fish is 117 mm. Apparently they are close to the latter fish and in the chart they have been included as part of the growth stages. Smaller material from the Artibonite basin is needed for comparison.

3. As has been mentioned, the fish of the two localities in the Cul-de-Sac Plain are the same as far as can be determined. There is considerable variability in the group, but as a whole they are more uniform than the Cuban forms.

To demonstrate the similarity of the Cuban and Haitian forms, the following table, listing Regan's and Eigenmann's descriptions of Cuban fish plus the characters of the Haitian fish, has been made:

CHARACTER	<i>Cuban Fish</i>		<i>Haitian Fish</i>
	Regan	Eigenmann	Cul-de-Sac Plain and Hinche
Depth in length	2 to 2.6	2 to 2.7	2.2 to 2.65
Head in length	2.5 to 3	2.6 to 2.7	2.3 to 2.85
Eye in head	3 to 4.3	3.5 to 5	3 to 5.4
Snout	Shorter than postorbital head	Same	Slightly shorter than postorbital head
Maxillary	Extending to below anterior margin of eye	Same	Not quite reaching anterior margin of eye
Premaxillary Process	Extends to above anterior third of eye	—	Same
Jaws	Equal, or the lower slightly projecting	Same	Same
Gill-Rakers	8 to 10	—	Same
Scales	28 to 31	27 to 29	30 to 32
Dorsal Fin	XV-XVI, 10 to 12	XIV-XVI, 10 to 12	XIII-XV, 11 to 12
Anal Fin	IV, 8 to 10	IV, 8 to 10	IV, 8 to 9

The chart (Fig. 269), illustrating a few of the characters mentioned above, shows some of the changes related to age. It emphasizes the unreliability of comparison of unequal sized specimens in this group of fishes.

While the similarity of the Haitian fish to the Cuban is quite close, there are also differences to be observed. Because of the variation of the forms, comparisons are not as easy to make as they might be, but some of the differences are given in following paragraphs.

A character that is not well demonstrated in the table given

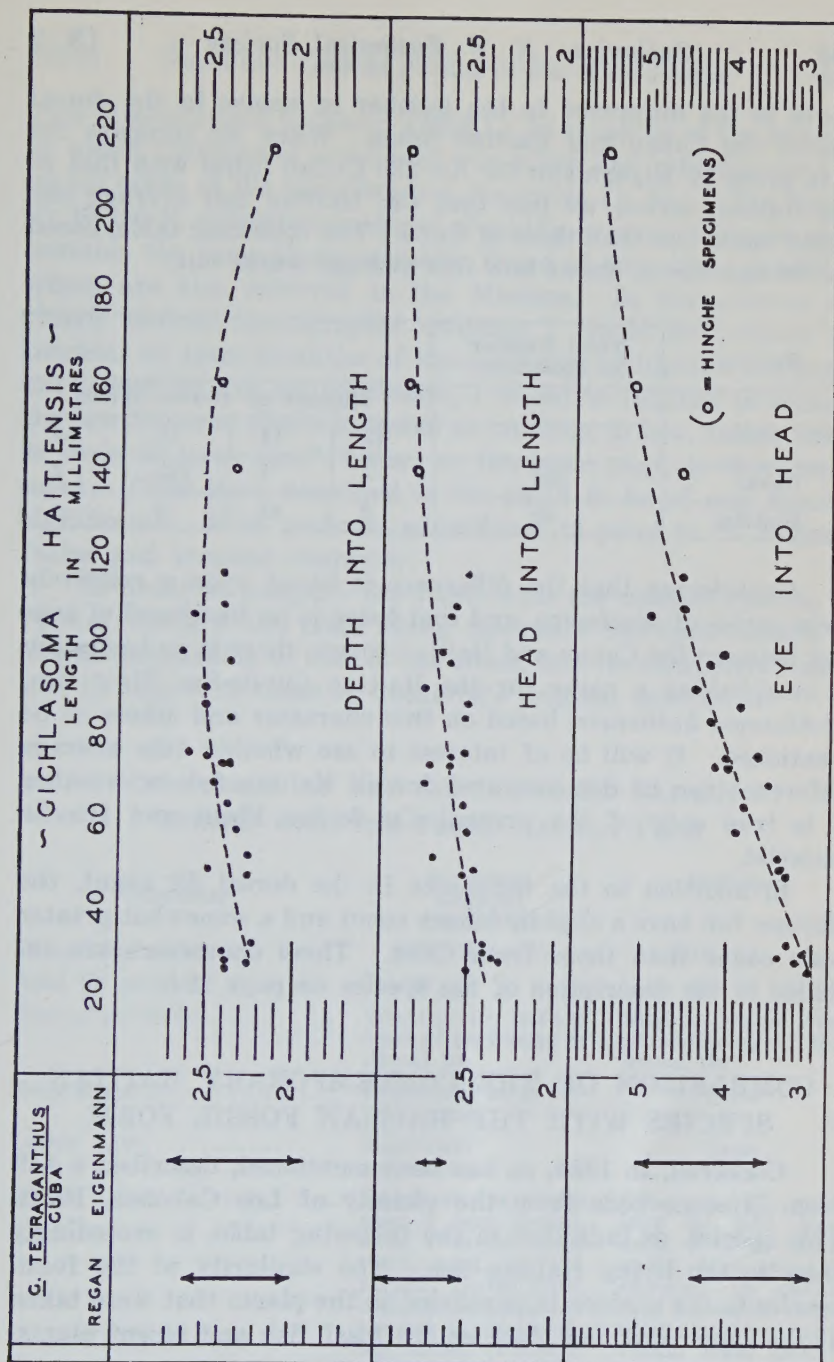


Fig. 269. Proportions of *Cichlasoma haitiensis* correlated with growth, and comparison of proportions of *Cichlasoma tetracanthus* of Cuba as recorded by Regan and Eigenmann.

above is the difference in the number of spines in the dorsal fins of the Cuban and Haitian fishes. When we compare the data given by Eigenmann for his 236 Cuban fishes with that of the Haitian series, we find that the Haitian fish average one dorsal spine less than those of Cuba. The following table, based on 305 specimens, shows how this average works out:

Species	Total Number of Specimens	Number of Dorsal Spines			
		13	14	15	16
Cuban	236	—	1	233	2
Haitian	69	2	61	6	—

Considering that the difference is based upon a relatively large series of specimens, and that there is no likelihood of contact between the Cuban and Haitian forms, there is no hesitation in establishing a name for the Haitian Cul-de-Sac Plain fish, *Cichlasoma haitiensis*, based on this character and others to be mentioned. It will be of interest to see whether this average difference can be demonstrated for all Haitian fish or whether it is true only of the present Cul-de-Sac Plain and Hinche material.

In addition to the difference in the dorsal fin count, the Haitian fish have a slightly longer snout and a somewhat greater scale count than those from Cuba. These characters are included in the description of the species on page 294.

COMPARISON OF THE CONTEMPORARY HAITIAN SPECIES WITH THE HAITIAN FOSSIL FORM

Cockerell, in 1924, as has been mentioned, described a fish from Miocene beds from the vicinity of Los Cahobas, Haiti. This species, as indicated in the following table, is exceedingly close to the living Haitian fish. The similarity of the fossil species to the modern is paralleled in the plants that were taken at the same time and place as the fossil fish and recent plants.

This is emphasized by Berry (1923). In speaking of the locality at which *Cichlasoma woodringi* was taken and referring to the plants taken at the same location, he states (p. 3): "The locality W 185 F, which is considered of middle or upper Miocene age, contains the same *Gymnogramme* found at two other localities which are also referred to the Miocene. In the absence of clearly defined stratigraphic evidence I would be inclined to consider all three localities of the same age. Although the present collections are not conclusive, I would be inclined to regard the few Miocene plants collected as pointing to late, rather than to early Miocene age." Later, on the same page, is this statement: "The flora described is too small to be of any special significance. It is, perhaps, superfluous to point to its modern facies and tropical character."

In order to compare the fossil with the modern species, a 74 mm. modern fish from Étang Saumâtre has been chosen, a length comparable to that of the fossil, and its characters listed side by side with those of Cockerell's original description.

COMPARISON OF THE CONTEMPORARY HAITIAN SPECIES WITH THE FOSSIL HAITIAN FORM

<i>Character</i>	<i>woodringi</i> Original description	<i>haitiensis</i>
Dorsal fin count.....	XIV, 10 or 11	XIV, 11
Anal fin count.....	IV, 10	IV, 10
Base of pelvic fin.....	Distinctly before level of beginning of dorsal fin.	Slightly behind level of beginning of the dorsal fin
Body shape.....	Practically as in <i>tetracanthus</i>	Same
Lower Jaw.....	Somewhat protruding	Same
Scales	Quadrangle, a little over 2 mm. broad, with 7 to 14 basal radii, and in the apical field, fine, ctenoid elements ar- ranged in decussat- ing series. (Position of scale not stated)	Quadrangle, 3.5 mm. long by 3.84 mm. deep, 7 to 12 basal radii, fine ctenoid elements in apical field arranged in in- terdigitating rows (Scale from middle of side)

COMPARISON OF THE CONTEMPORARY HAITIAN
SPECIES WITH THE FOSSIL HAITIAN FORM

Measurements in Millimeters:

	<i>woodringi</i>	<i>haitiensis</i>
Eye	7.5	7.5
Orbit to end of lower jaw	About 16	10
Orbit to end of upper jaw	" 14	9.3
Length of spinous dorsal	" 21	25.2
Length of soft dorsal	" 9	10.2
Length post. dorsal spines	" 9	8.7
Length soft dorsal rays	Over 10, damaged	13.5
Vertebrae in region of soft dorsal	3 in about 4.4	Length of one vertebra 2.3
Longest anal spines	About 10.5	9.4
Soft anal rays	Over 21	16
Tip of lower jaw to base of anal fin ..	46	52
Base of pelvic to base of anal fin	About 20	22
Depth of body at level of pelvic fin ..	26.6	28.2
Depth of body at about end of soft dorsal fin	12.3	12

Examination of the table reveals the following differences between the fossil and living forms. The fossil species is described as having:

1. Pelvic fin base distinctly before the origin of the dorsal fin, instead of equal to or slightly behind.
2. Smaller sized scales.
3. Different sized vertebrae.
4. Shorter anal rays.
5. Longer distance between the orbit and the tips of the upper and lower jaws.

In order to check up on these differences, Dr. George S. Myers, Curator of Fishes at the United States National Museum, was asked to reexamine the fossil fish. His notes, which he has given me permission to quote and for which I tender my thanks, are as follows:

"I have obtained the type of *Cichlasoma woodringi* from Dr. Gilmore and examined it under a binocular. It is on a slab of very friable material. I find that there are very clearly 15 dorsal spines, instead of 14 as given by Cockerell, and 10 soft rays. There are four anal spines, though part of the last is split off and looks like a fifth. The soft anal rays cannot be counted.

"In examining the scales and other external features I have picked out a *Cichlasoma* from Source Trou Caiman, Haiti, collected by Dr. R. M. Bond, of exactly the same size as the fossil,

and used it as reference. On the type slab, the scales are well preserved only on the breast at the region which would be covered by the appressed pectoral. Referring to the recent fish I find the scales at that point *exactly* like those of the fossil in size, and so far as I can see, in ornamentation as well.

"As the principal diagnostic character of *C. woodringi*, Cockerell uses the anterior position of the pelvics. I have carefully examined these fins and their bases in the type. They are scarcely 3 mm. anterior to the position in the recent Trou Caiman fish. Furthermore, the fossil has been much crushed and the bones disarranged in the thoracic region and I have little doubt that the right pelvic has been pushed forward out of its normal position.

"In all other ways in which it is possible to compare the fossil with the recent fish, such as head length, shape of body, etc., I can see no specific differences whatever between the type of *C. woodringi* and the recent specimen from Trou Caiman."

These notes of Dr. Myers remove the different sized scales, the disparity in the position of the pectoral fins, and the difference between the measurements of the distance between the jaws and the eye—the latter two evidently being due to the compression and consequent forward extension of the anterior part of the fish during fossilization—from the alleged distinction between the fish. Two characters remain, the shorter anal rays and the difference in vertebrae size.

As far as the rays are concerned the difference is not an especially good one, as there might easily be sufficient variation to account for this.

The difference in size of vertebrae, however, seems to constitute a real distinction between the two forms. The difference in measurements has already been noted. Dr. Myers in his re-examination of the holotype of *C. woodringi* states: "I have worked out the number of vertebrae as follows: There appear to be two (plus hypleural = 3) lost at the tail. By gently working off the matrix which shows as a light blotch across the fish in Cockerell's plate, I can count all the rest of the caudal vertebrae, and by counting the neural spines, get the number of abdominal centra. My count is 33 (including the hypleural as one of these) or 14 plus 19. I do not think that there can be an error of more than two in my count."

For comparison with this data the vertebrae counts of six Étang Saumâtre specimens have been tabulated. All six agree in possessing the same number of vertebrae that Regan recorded for modern Cuban *C. tetracanthus*—13 abdominal, plus 15 caudal, plus 1 hypleural (urostyle).

It is evident, therefore, that, even accepting Dr. Myers' minimum count of 31, the fossil cichlid can be distinguished from the contemporary form by slightly smaller and more numerous vertebrae. The distinction can be shown thus:

		Abdominal	Caudal	Urostyle (Hypleural)	Total
<i>C. woodringi</i>	1 spec.	14	16 or 18	1	31 to 33
<i>C. haitiensis</i>	6 spec.	13	15	1	29

DESCRIPTION OF A NEW SPECIES OF HAITIAN CICHLID FISH

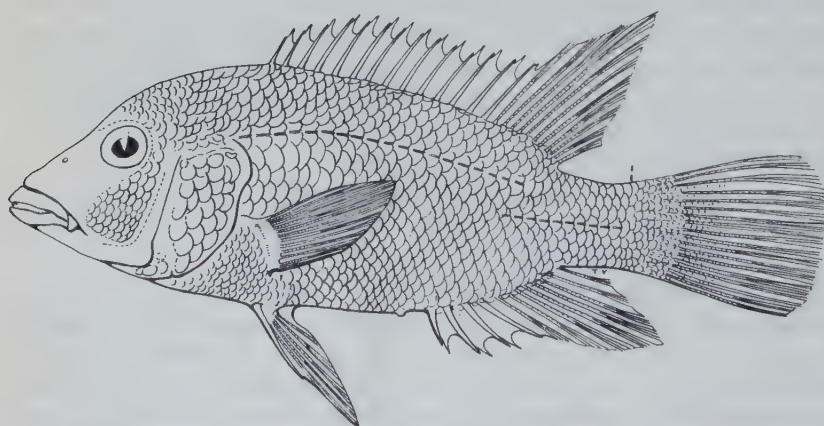


Fig. 270. *Cichlasoma haitiensis* Tee-Van. Type specimen, 108 mm. standard length.

Cichlasoma haitiensis new species

TYPE: No. 7302, Haitian Expedition, New York Zoological Society, Étang Saumâtre, near Maneville, Cul-de-Sac Plain, Haiti, March 15, 1927; standard length 108 mm. Type in the

collections of the Department of Tropical Research of the New York Zoological Society.

Sixty-five specimens from the type locality and Grande Rivière de Cul-de-Sac, plus three specimens from Hinche, are also in the collection.

FIELD CHARACTERS: Small to medium sized, compressed fishes living in fresh water, occasionally in brackish, with a long dorsal fin composed of rays and spines, the spinous portion longer than the soft; a single nostril on each side of the head; small canine teeth present anteriorly. Grayish to brownish black, variable; body plain or with small black spots. Occasionally dark vertical bands are present and a common color pattern is a spot at the base of the tail, one on the middle of the sides and one at the upper margin of the opercle.

DESCRIPTION:² Depth of body 2.2 to 2.65 (2.56) in the length; length of head 2.34 to 2.75 (2.7); snout slightly shorter than or equal to postorbital part of head (2.7); diameter of eye 3 to 5 in head (4.7); interorbital space slightly less than eye diameter in a 29 mm. fish and a 57 mm. specimen, slightly greater than eye diameter in a 117 mm. fish (3.9 in head in type), once and two-thirds the eye diameter in a 215 mm. Hinche fish. Maxillary slightly exposed (2.95 in head) extending to just below the anterior margin of the eye or not quite reaching the eye; jaws equal or the lower slightly projecting; preopercle with a shallow notch on its posterior limb; teeth of the upper jaw with anterior pair of teeth enlarged, in larger specimens two or three pairs are enlarged; lower jaw with two or three pairs enlarged, forming weak canines; fold of the lower lip continuous; 8 to 10 gill rakers on the lower part of the first arch; 5 branchiostegal rays. Scales 30 to 33 plus a few small scales on the caudal, 4 between the lateral line and the anterior part of the soft dorsal, 7 between the lateral line and the origin of the spinous dorsal, a small sheath of scales, especially noticeable on the soft dorsal; lateral line pores averaging 18 to 20 plus 9 to 11. Dorsal fin XIII to XV, 11 to 12, the first spine short, the spines then gradually increasing to the last, but occasionally the penultimate 4 or 5 are equal in length and the last spine

² For ease of comparison the order of description is the same as that used for *tetracanthus* by Regan. The proportions are those of a series of 25 specimens examined and measured. The proportions of the type specimen are given in parentheses.

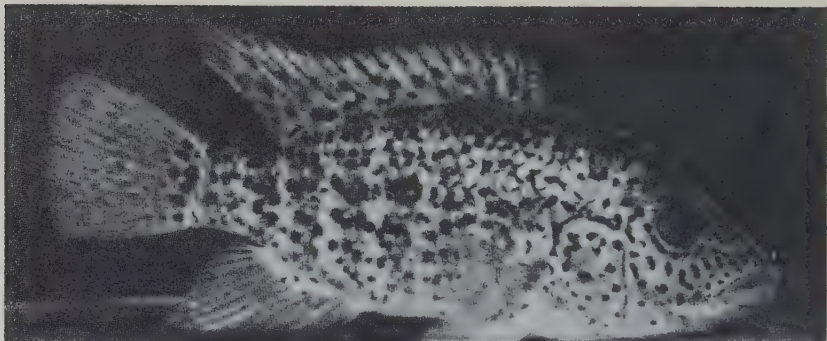


Fig. 271. *Cichlasoma haitiensis*. Specimen from Étang Saumâtre, Haiti, 100 mm. standard length.

longest; soft dorsal fin tip extending, when laid back, from the base of the caudal fin in small, to almost to the tip of the caudal fin in large, specimens. Anal IV, 8 to 10. Pectoral fin tip not reaching to the vertical of the origin of the anal fin; pelvic fin reaching the anus or slightly beyond, in some specimens shorter. Caudal subtruncate or rounded. Profile rounded from dorsal fin to eye, then more or less straight from eye to snout.

Color highly variable. Pale gray through olivaceous brown to almost black, with varying degrees of the following patterns: Some or all of the patterns may be completely absent. Body with small black spots. A series of vertical bands on the body, most prominent in small fishes. A black spot on the middle of the



Fig 272. *Cichlasoma*. Specimen from Hinche, Gurabo River, Haiti, with gibbous forehead, standard length 215 mm. This is the largest specimen mentioned in this paper.

sides, another at the base of the caudal, and a much paler one at the origin of the lateral line; these three spots, especially in small fish, sometimes connected by a narrow black line. Fins pale to dusky; in dark specimens the fins are almost as black as the body.

The three large specimens from Hinche have not been included in the above description. They are very close to the present species and may be the same. The disparity in size makes comparison impossible.

Larger specimens have gibbous foreheads, as is usual among cichlids and some other families.

NATURAL HISTORY NOTES

COMMON NAME: In Haiti these fish are known as "Odo."

OCCURRENCE IN HAITI: This species has been taken by the Haitian Expedition at the following localities: Fresh water stream at Maneville, Étang Saumâtre, and various places in Étang Saumâtre to the eastward of Maneville; Grand Rivière near the Agricultural Station in the Cul-de-Sac Plain. It is probably distributed through the streams of the basin.

Étang Saumâtre³ is brackish, the salinity being about one-fifth that of sea water. It has no drainage at present, and it is fed by small streams.

ABUNDANCE: In many localities, such as those at Étang Saumâtre, this is a common species. In this lake they were sufficiently abundant to be a source of food for the natives, and small baskets of these fish were observed being carried to town.

METHOD OF CAPTURE: Taken by us mostly in small seines. The natives capture them by using sheets of cloth in place of seines. These they manoeuvre under the fish and then rapidly bring water, fish and all to the surface. One small Negro boy was especially adept at capturing Odos. His method was to stalk a fish and chase it into a small cavity in the bottom. He then dived under, closing up the cavity with his hands, and removed the fish.

³ For details of this lake see Woodring, Brown and Burbank, 1924.

SOCIABILITY: The majority of these fish were found solitarily or in pairs, rarely in small groups of six to eight. They were often seen in considerable numbers among schools of poeciliids. This was especially true of localities in Étang Saumâtre along rocky shorelines where fresh water streams ran into the lake. In the Grand Rivière they were found in company with fresh water mullets, *Agonostomus monticola* (Bancroft).

FOOD: The stomach contents of numerous individuals from Étang Saumâtre included algae and other water plants and quantities of small white turret shells. Dead shells of this mollusc were exceedingly abundant along the shores of this lake.

SIZE AT MATURITY: Fishes of 75 mm. standard length are capable of breeding. An 87 mm. fish taken on March 15 contained about 300 eggs ready for spawning, each egg being a broad oval, 1.5 mm. by 2 mm. in diameter. A male of 112 mm. taken on the same day had considerably enlarged gonads.

SUMMARY

Cichlid fishes have been reported, excluding Trinidad as belonging, zoologically, to the continental mass of South America, from the West Indian islands of Barbados, Jamaica, Cuba and Haiti.

The Barbados record is considered as an error in locality for a Cuban fish.

The Jamaican record is also a questionable one, although it is quite possible that cichlid fishes will be found on that island. The fish upon which the Jamaican record was based belonged to the group of species possessing 8 to 10 anal spines, while those of Cuba and Haiti, with which this paper is concerned, have but four.

The history of the Cuban fish shows that this form is exceedingly variable, the variation having resulted in the description of five new subspecies and one species, all of these later being synonymized under *tetracanthus*. It is probable that further field study will show that some of the Cuban forms can be correlated with factors such as sex.

In connection with the variability of the Cuban fish, the species of *Cichlasoma* from Central and South America have

been tabulated, with the result that it is shown that in the smaller but more varied land mass of Central America there are four times as many species as in the larger but more uniform mass of South America. Although it is evident that there is a great deal more variation in the northern portion of the range of the genus, it is also suggested that, judging by the Haitian and Cuban species, many of these forms may later be shown to be variations or phases of other species.

Cichlid fishes are known in Haiti from a fossil species described by Cockerell, from a contemporary specimen reported by Myers and from the present Haitian Expedition material.

Examination of the contemporary Haitian fish reveals that it is close to *tetracanthus* of Cuba. From the scanty material at hand it seems that there is either a separate form from each of the drainage basins from which specimens are at hand, or that there is wide variation, as has been found in Cuba.

The Haitian Cul-de-Sac Plain specimens, when compared with the Cuban form, show an average lesser number of spines in the dorsal fin, a longer snout and a slightly greater number of scales. Whether the difference in number of spines of the dorsal fin will hold true of the Haitian fishes as a whole, or whether it represents merely the characters of the Cul-de-Sac Plain fish, is not known. The Cul-de-Sac Plain fish is considered as a new species, *Cichlasoma haitiensis*.

Comparison of the living Haitian fish with the Miocene fossil *Cichlasoma woodringi* Cockerell, has been made. From a reexamination of the fossil by Dr. George S. Myers, Curator of Fishes of the United States National Museum, and comparison with a contemporary specimen, it is evident that the fossil fish cannot be distinguished externally from the living form. However, the fossil form has smaller and more numerous vertebrae, and for the present this species must be maintained.

A new species, *Cichlasoma haitiensis*, is described from Cul-de-Sac Plain fishes.

Natural History notes are given relating to Common Name, Occurrence in Haiti, Abundance, Method of Capture, Sociability, Food and Size at Maturity.

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